

CONFIDENTIALESTABLISHED
1886CH
JAN

HFK:mpk

one. error - WE
only your action
 pls. STAT
 WE 5 July 55
 UNIVERSITY

Logistics was
 notified on 26 June 55
 on the phone
 letter written on
 27th typed & hand
 carried 28th Plougher

June 27, 1955

FILE STAT
 24 HR
 CLOCKWORK

Subject: Recall of Clockwork Tooling

This letter confirms our telephone conversation of this afternoon, in which your wishes for the recall of the clockwork tooling were discussed. As mentioned in the conversation, we have this morning received instructions from your contractual section regarding the disposition of the same tooling. Since the tooling has not yet been turned over to us by the subcontractor upon completion of the contract, we feel that disposition of these items along the lines outlined by your contracting office should not be made. In the absence of any other instructions from your office, we shall therefore dispose of the tooling as outlined in your letter of June 22, 1955, and as confirmed below.

We have called Thomaston Special Tool Company and have arranged to have delivery of the clockwork tooling made simultaneously with the final delivery of the production and training mechanisms; the date of this delivery will be approximately July 1. Upon receipt of this tooling at the Reservation, the writer will join Mr. Forthofer of Universal Match Corporation to inventory and sign over the tooling to UMC's custody. Storage of the tooling will very probably be made at least on a temporary basis in the Miscellaneous Building here at the Reservation.

In view of the contractual responsibility involved and the necessity of obtaining a clear line of demarcation in this responsibility, it is of the utmost importance that the responsibility of Arthur D. Little, Inc. be terminated upon the satisfactory transfer to UMC custody.

STAT

[REDACTED]

CONFIDENTIAL

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[REDACTED]

-2-

June 27, 1955

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As mentioned in our telephone conversation, we would appreciate your contacting your contractual section people and informing them of the present situation so that they may be fully cognizant of our impending actions. We feel that this would be the simplest and most direct measure to prevent any misunderstanding as regards the responsibility, both as regards custody and contractual completion.

Should there be any change in your wishes as to the disposition of the clockwork tooling, we would appreciate immediate notification via telephone, and in view of the contract termination, confirmation of any decision in writing.

Very truly yours,

[REDACTED]

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CONFIDENTIAL

File 24hr clockwork

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STAT

QK-15-529
C-59411.2

Subject: Request for Additional Funds

This confirms a telephone conversation between Mr. McCeney and the writer on May 26, 1955, during which the requirement of additional funds for completion of the clockwork delay program was outlined.

As discussed with [redacted], the origin of this fund requirement lies in an estimate, made by the writer, dated March 26, 1954, in which funds for the various items of the clockwork project were listed. In this estimate, however, the additional cost items for the cocking devices and positive starters were estimated for only 100, rather than 1,000 units. The requirements for special adapters were completely omitted. It is upon this error that this request for funds is based.

STAT

Following is the breakdown and summary of funds required:

* 900	Cocking Devices @ \$.40 each	\$360.00
* 900	Positive Starters @ \$1.40 each	1,260.00
1000	Adapters @ \$1.60 each	1,600.00
** 120	Additional Adapters @ \$1.60 each	192.00
		<u>\$3,412.00</u>
	Funds on hand as of May 27, 1955	<u>1,350.00</u>
	Funds required	\$2,062.00

DOC	REV DATE	BY
ORIG COMP 056	OPI 56	TYPE 01
ORIG CLASS 14	PAGES 2	REV CLASS
JUST	NEXT REV	AUTH: HR 10-2

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CONFIDENTIAL

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May 27, 1955

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* 100 ordered 3/11/54 under Purchase Order No. 10298.

** 120 units authorized by [redacted] for training purposes.

STAT

It is therefore requested that a sum of \$2,100.00 be made available prior to 30 June, 1955, for this purpose.

Very truly yours,

STAT

Approved by: [redacted]

STAT

Acting Director

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STAT.

HFK:mpk

April 4, 1955

STAT

QK-15-529C-59411Subject: Packaging for 24-Hour Delay Mechanism

Both during the writer's visit to your office on March 30th, and [] visit to the Reservation on April 1st, 1955, the subject of the unit packaging of the 24-Hour Clockwork Delay Mechanism was discussed and a single prototype was reviewed.

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[], during his visit to the Reservation, approved the prototype and requested that it be implemented by the purchase of the necessary components. This action has been initiated.

STAT

The specifications for the tear-strip cans, as ordered from the George D. Ellis & Sons Company, Inc., Philadelphia, Pa., are as follows:

Size: Std. 4" O.D. (3-31/32" I.D.) x 3" net inside height (3.128" body height).

Material: 0.015" stock, 1.25# hot dip tin plate.

Details: a) Tear strip one end only.
b) Open on tear-strip end.
c) Both closures compound lined for permanent seal.

DOC	REV DATE	BY
ORIG COMP 056	OPI 56	TYPE 01
ORIG CLASS M	PAGES 2	REV CLASS
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April 4, 1955

- d) Brush inner tear-strip score with vinylite.
- e) Use extra-heavy tear-strip keys, both ends.

Test: Test for tight seams and top closure in hot water prior to finishing.

Finish: Degrease and prime with wash primer MIL-P-15328 (Ships) or equivalent. Paint one (1) coat with Federal Specification TT-C-595 No. 14150, air drying lusterless green lacquer, per Chemical Coatings Co., Rocky Hill, Connecticut, No. 12-889.

Very truly yours,

STAT

Handwritten signatures and initials

STAT

[Redacted]

HPK:mpk

February 11, 1955

[Redacted]

STAT

QK-15-529
C-59411

Subject: QK-15-529 Trip Reports

In view of the interest with which both [Redacted] and [Redacted] are following the production and assembly of the 24-hour clockwork movements and cases, we are forwarding herewith two (2) copies of the writer's trip reports reviewing these phases.

STAT
STAT

Very truly yours,

[Redacted]

STAT

Attachments 4

DOC	REV DATE	BY
ORIG COMP <u>056</u>	OPI <u>56</u>	TYPE <u>01</u>
ORIG CLASS <u>7</u>	PAGES <u>7</u>	REV CLASS
JUST	NEXT REV	AUTH: MR 70-2

MEMORANDUM

To:

Case: QK-15-529 Date: February 9, 1955 Page: 1

STAT

Subject: C-59411 Telephone Call to New Haven Clock & Watch Company

1) As mentioned in the writer's Trip Report, dated February 9, New Haven was contacted this morning via telephone to obtain a confirmation of their estimated delivery date of March 15, 1955, for the remaining 1,003 movements under this case.

2) That tentative date was confirmed by the Assistant Chief Engineer , who acts for the Chief Engineer, in this case.

STAT

STAT

- 3) In addition to this confirmation, it was also agreed that the 300 movements completed will be immediately shipped to Thomaston, in addition to all of the 24-hour dial plates. Thomaston has been requested to inform us when this shipment arrives so that the actual restarting of the Thomaston production line can be closely followed.
- 4) Needless to say, New Haven's performance during the next month will be very closely followed.
- 5) The Client's Project Engineers for this case, Mr. Hahlen and Mr. Chevally, were informed of these developments and New Haven's final commitments via telephone this morning. We are to keep the Client informed as closely as possible of the general developments, in particular, the production rate that Thomaston can achieve during the coming months.

By

STAT

/mpk

From

STAT

MEMORANDUM

To: 

Case: QK-15-529 Date: February 9, 1955 Page: 1
C-59411
Subject: Trip Report - Thomaston Special
Tool Company

STAT

On Monday, February 7th, the writer, after visiting New Haven Clock & Watch Company in New Haven, visited the Thomaston Special Tool Company in Thomaston, Connecticut, who are currently manufacturing the case and accessory parts for the 24-Hour Clockwork Delay Mechanism. Very little needed discussion during this visit except the following points:

- 1) Thomaston desires that partial deliveries of watch movements be made by New Haven so that the Thomaston production line may again be started.
- 2) Thomaston also wishes that the entire shipment of 24-hour dial faces be sent to them, for the same reason as above.

Thomaston has for some time had the greater part of the manufacturing and sub-assembly work done for this project. With the exception of gasket changes and a major alteration to the back plate cap, they for some time have of necessity remained idle awaiting delivery of movements from New Haven. Throughout the entire job, relationships with Thomaston and ADL, in contrast to those experienced with New Haven, have been excellent.

By 

STAT

/mpk

From

STAT

MEMORANDUM

To:

Case: QK-15-529 Date: February 9, 1955 Page: 1 STAT
C-59411
Subject: Trip Report - New Haven Clock &
Watch Company

On Monday, February 7, 1955, the writer visited the plant of the New Haven Clock & Watch Company in New Haven, Connecticut, and talked with Messrs. Denegre, Marches and Field regarding the present status and positive delivery time of some 1,003 special watch movements for this case.

A previous telephone call on Friday, February 4th, to Mr. Marches, the Assistant Chief Engineer, indicated that the organization for this case at New Haven was in a great deal of confusion. The visit on Monday confirmed and emphasized this belief. The following points are made to describe the conditions existing:

- 1) ADL received a set of the Client's drawings which had been previously submitted to New Haven for their inspection and review. Numerous revisions were indicated on these drawings. Investigation of the accompanying New Haven drawings however showed that many of these corrections had been made also to the master drawings held by New Haven; this points out that the original drawings submitted to ADL by New Haven were apparently not brought up to date before they were sent to us for transcription. As a result, considerable work must be done in drawing revision to bring them again up to date.
- 2) During the previous telephone discussion with on February 4th, STAT it was indicated that a delivery date for the 1,003 movements was to be March 1, 1955. During the visit however on February 7, it became apparent that this is not a realistic date. A spot inventory of the movements, made by their production foreman and the writer, indicated that a total of 811 units were on hand in various stages of assembly and test. When questioned about the remaining 192, neither the production foreman, STAT nor Mr. Denegre could give a plausible explanation.
- 3) Although an inventory of December, 1954, was mentioned, the only inventory that was available and presented for the writer's inspection was dated December 27, 1953. This indicated that little or no inventory control has been exercised on this material for some time. This belief was further borne out by the fact that there was later considerable discussion between the production foreman and the parts foreman as to whether or not parts previously ordered had ever been manufactured and supplied. The production department said they had been ordered but never supplied; the parts department, that they had been supplied and apparently lost elsewhere.
- 4) On most of the units seen during the spot inventory, the new hands and hour drums were installed; these new parts have an excellent appearance and apparently will well satisfy the need for more accurate reading and less reflectivity of the blackened surface. This progress was the only bright spot in the entire discussion.

From: HFK

C-59411

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February 9, 1955

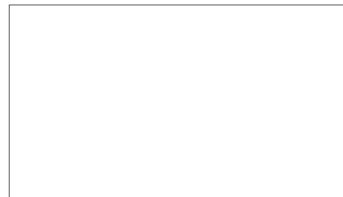
- 5) As previously mentioned, there was considerable dissension among the New Haven personnel, and a rather lively discussion, in the writer's presence, was carried on in an attempt to decide what was to be done next. It is currently believed by all New Haven personnel, and tentatively promised by the Chief Engineer, [redacted] that March 15 is a realistic delivery STAT date for these movements, additional production of parts notwithstanding.
- 6) The writer shall call [redacted] on Wednesday, February 9th, to determinSTAT the exact status of the production and at that time obtain another firm date for production delivery. In the meantime the writer shall request New Haven to make a partial delivery to Thomaston Special Tool Company of the 300 movements which are on hand and have been completed. Complete delivery of the hour dials will be also requested; with these parts in hand Thomaston should be able to restart their production line.
- 7) As a matter of record the following listing reflects the spot inventory figures obtained during the writer's visit:

Units awaiting delivery	1,003
Ready for delivery	300
Awaiting run-in	330
To be repaired	108
To be re-assembled	10
Awaiting retiming	<u>63</u>
Total accounted for	<u>811</u>
Missing at inventory	192

The writer believes it was made amply clear to the people at New Haven that delivery must be made in the very near future and that any commitment for delivery that they now take on shall be very closely followed. It is realized that it is impossible to pose any threat or penalty against them for failure to meet this delivery date; on the other hand, it is felt that a very strong stand and, if needs be, a strong written statement of dissatisfaction will provide sufficient force to induce New Haven to meet this delivery date.

In view of the past unfulfilled promises on the part of New Haven, in addition to the present disorganization, the writer strongly recommends that any future work along the line of a clockwork time delay be taken to manufacturers other than New Haven.

By



STAT

/mpk

MEMORANDUM

To: Case: 59411
59416 Date: February 11, 1955 Page: 1 STAT
59427 Subject: Minutes of the Meeting with the Client
on February 4, 1955

- 1) On Friday, February 4, 1955, Mr. Chevally and a second project engineer from the Client's office visited the Reservation to review the clockwork, Magnet Box and the Stinger cases. The following notes reflect the items discussed and decisions made in each case.
- 2) Clockwork, C-59411 (QK-15-529)
 - a) J-Feder Mechanism
 - (1) Since the J-Feder mechanisms are to be rebuilt by Frankford Arsenal, it was agreed that ADL shall do no further work on these items.
 - (2) The J-Feder mechanisms on hand shall be held ready for shipment, possibly in sealed cans, at some future date estimated to be in the order of two to three months hence. will inform ADL of the ultimate disposition of these mechanisms. STAT
 - (3) The writer informed that it was felt here that a separate Final Report for the J-Feder mechanism would be advisable in view of the unpredicted change in plans. STAT
 - b) 24-Hour Mechanism
 - (1) emphasized the importance of obtaining the initial rough drafts of the 24-hour mechanism instruction sheet as soon as possible, so that the necessary lead time for the Client's printing of these sheets can be achieved. STAT
 - (2) agreed that he will assist ADL in listing the "usage factors" which are thought by the Client to be important for the 24-hour mechanism. These "usage factors" will include such items as the techniques for setting the mechanism with gloved hands, etc. STAT
 - (3) expressed extreme interest in the fact that New Hav Clock & Watch Company appears to again be in trouble with the 24-hour movement production. He asked that ADL keep him informed as closely as possible. STAT
- 3) Magnet Box, C-59416 (QK-15-541)
 - a) ADL is to package one hundred four (104) Magnet Box units in accordance with the temporary packaging specifications. As soon as the packaging has been developed to the point that the specifications can be considered satisfactory, the 104 units are to be shipped.

From HFK

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February 11, 1955

- b) The forming pin sticks are no longer to be used with this unit; all existing sticks shall be removed and destroyed.
- c) The manufacturing inspection for the Magnet Box shall include a section for the inspection to detect stripped threads in the bottom cover.
- d) The finished rough draft of these specifications including packaging and packing shall be transmitted to the Client during the writer's visit in the week of February 21.

4) Stinger, C-59427 (QK-15-558)

- a) [] expressed interest in the coming assemblies of one hundred twenty four (124) units under our Case 59427, and asked that he be informed when this production is in progress so that he may visit the Reservation at that time. STAT
- b) [] requested that reference be made in the previous Stinger Final Report of the impending production of 124 units. STAT

By



STAT

/mpk

Anderson
Drayton
He *mpk*
STAT

August 17, 1954

STAT

QK-15-529-AB

In a telephone conversation on August 16, 1954, Mr. Dan Brunt authorized the change from slotted-head to Philips head screws for use on the front and back plates of the AB 24-hour delay mechanism case.

The estimated increase in cost for procurement, copper plating and blacking of these items is \$100.

Very truly yours,

STAT

/mpk

000	REV DATE	BY
ORIG COMP	056	GPI 56
ORIG CLASS	M	PAGES 1
JUST	NEXT REV	AUTH: HR 70-2

Hammarston
Anderson
Decker

STAT

August 17, 1954

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QK-15-529-AB

Subject: Minutes of Meeting
at Thomaston, Connecticut

On Wednesday, August 11, 1954, the writer met with [redacted] of Thomaston Special Tool Company to discuss the present status and immediate future of the 24-Hour Clockwork Delay Mechanism. The following notes outline the topics discussed and the action items determined for both Thomaston Special Tool Company and Arthur D. Little, Inc.

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1. Revised Cap: ADL Drawing Nos. 210b-418 and 210b-435, "Rear Cover Plate" and "Cap" respectively, have been submitted to Thomaston and authorization has been given to commence production of these caps and revision of the plate to accommodate the caps.

Action: Thomaston: produce 1000 caps and revise plates.
ADL: purchase necessary O-rings and forward to Thomaston.

2. Finishes: Thomaston is still having difficulty in obtaining good paint bonding on both front and rear plates. Present zinc finish is apparently too smooth; investigation of matte finish, probably of cadmium, is indicated.

Action: Thomaston: check with commercial electroplating firm for information.
ADL: check with paint manufacturer for advice in use of this particular enamel.

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CRIC COMP	056	001 56
CRIC CLASS	M	PAGES 6
JUST	NEXT REV	ACTED HQ 10-1

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Mr. A. L. Weast

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August 17, 1954

Both Thomaston and ADL to confer when information is available. (No plating has yet been done on the 900 remaining cases.)

3. Positive Starter: Thomaston has all parts on hand awaiting final instructions to begin assembly of 900 remaining units. Drawings are not up-to-date, however.

Action: ADL to make necessary revisions to drawings, using sample parts for model, and send prints to Thomaston for checking.

4. Cocking Plug: Thomaston has 75% of parts on hand, but must produce new caps for the revised unit. 1000 units to be made.

Action: ADL to make necessary drawings of revised unit, using prototype as a model, and send prints to Thomaston for checking.

5. Wire Lugs: Previous experience shows that wire lugs on case tend to turn under load and loosen gasket retaining screws with which they are attached to the case. This is a potential source of gasket failure. Redesign of lug is advisable, making use of bent "dog-ear", as shown in the accompanying sketch to prevent turning.

Action: ADL to redesign lug and send drawing to Client and Thomaston for information and checking.

NOTE: This item has not been approved for the present production lot. To be incorporated in future designs.

6. Gaskets: New flat gaskets for front and rear cover plates, adapter, and both safety- and stop-start spindles are to be made. ADL is to specify Buna-N compounding.

Action: ADL: send Buna-N compounding specification and revised gasket drawings to Thomaston by August 18, 1954.
Thomaston: to procure new gaskets for 1000 units.

7. Shipping Plug: Thomaston has been authorized to enlarge the slot in the existing shipping plugs to equal that in the revised rear plate cap, i.e., .125" wide by .093" deep.

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August 17, 1954

This change of slot in both parts allows use of combat knife or other heavy blade to force removal of plug or cap without a wrench. ✓

Action: Thomaston to enlarge slots in and reblacken 1000 plugs.

NOTE: This is an extra-commitment item; no exact cost has yet been established, although cost is estimated to be less than \$75.00.

8. Adapters:

Thomaston has all parts on hand but has not begun assembly. Assembly to be made concurrently with mechanism and case to utilize manpower more efficiently. ADL has agreed to this procedure. Large "corprene" washer on the adapter is to be scrapped, replaced by "O"-ring. ADL to advise if second washer can also be scrapped and replaced by commercial "O"-ring.

Action: ADL to bring adapter drawings up-to-date. Purchase and install "O"-rings after delivery of adapters. ADL has agreed to purchase production "over-run" (all adapters produced in excess of 1000 basic order) for purposes of ADL's and Client's destructive testing. Purchase price to be that already quoted and approved. ✓ ?

9. General Assembly:

- a) The use of Philips-head screws, in place of the present slotted-head screws for the front and rear plate fasteners, was discussed. Advantages offered are twofold: (1) Faster assembly, with less chance of scratching and gouging, by use of air-drive torque-limiting screw driver (2) better control of torque used to seat screws. It is estimated that change-over to Philips-head screws will cost approximately \$90.00 for parts and \$10.00 for plating and blacking, a total of \$100. The Client's opinion on this item is to be asked before Thomaston is advised of any action to be taken. ✓ ok ?
- b) Minimum, and possibly maximum, torque setting for front- and rear-plate screws must be determined. ADL to establish and advise Thomaston. ✓

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August 17, 1954

- c) Trip-lever coil spring torque, expressed in terms of the number of coil-turns taken up on the spring, must be determined. ADL to establish and advise Thomaston. ✓
- d) It was pointed out that the final adjustment of the assembled mechanism must include a correction of the minute hand so that it coincides exactly with the dial "FIRE" marker when the firing linkage trips. Thomaston recognizes this fact and has accepted the responsibility for making the adjustment. ✓
- e) It was pointed out that the surface of the trip lever which rides the hour drum is a very important factor in determining the reproducibility of the mechanism in operation. Longer-than-ordinary tumbling of the trip lever during the finishing operation is necessary to reduce the probability that any burr or irregularity exists on this rubbing surface. Thomaston has agreed to this procedure of finishing. ✓
- f) The use of a sealing compound, Permatex #1 (a hardening grade), has been recommended for sealing of: (1) Safety- and start-stop adapter threads (2) Front- and rear-plate screw fasteners. Thomaston has agreed to this procedure. ✓
- g) The use of Dow-Corning DC-11 Silicone Grease has been recommended as both a sealer and lubricant in the safety- and start-stop spindle glands. Thomaston has agreed to this procedure. ADL shall provide the DC-11 and information regarding amount and application. ✓?
- h) To test die-castings for flaws, such as cold shuts and porosity, Thomaston recommended that all case-castings be tested underwater with an internal pressure of 20 - 25 psig for at least 2 minutes. ADL concurs and shall incorporate this procedure into the specifications. ✓
- i) The citation of Federal, MIL, JAN and other government specifications for materials and finishes used in the manufacture of this device requires that sub-contractors /

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August 17, 1954

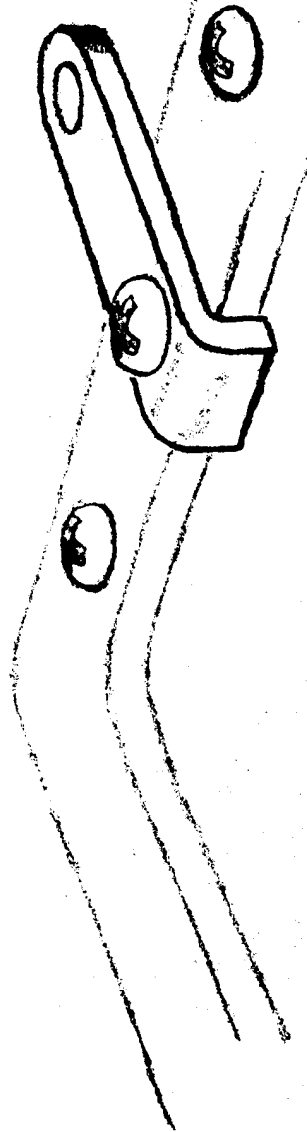
be supplied with copies of those applicable to their particular work. ADL has agreed to send one copy of each specification cited to Thomaston.

The meeting was more productive of action than any other of recent date; this undoubtedly was the prime result of experience accumulated during the past few months by both parties concerned. The writer mentioned a scheduled completion date of January 1, 1955, for this program, and Thomaston felt that this was a reasonable target date for their particular work. ADL's expediting of action items within the next month will do much to making this target date a reality.

Very truly yours,

STAT

Enclosure
HFK:mpk



PROPOSED ALTERATION OF WIRE LUG

CS0214-AB

PK 9/17/94

STAT

August 10, 1954

STAT

QK-15-529-ABSubject: Minutes of Meeting with
Messrs. [redacted]

STAT

On August 4 and 5, 1954, the writer met with [redacted]
[redacted] at the reservation to discuss the AB program; the following
notes reflect the decisions made at that meeting:

STAT
STAT24-Hour Delay Mechanism

- 1) The second battery of lubrication tests recently completed for the 24-Hour Mechanism have confirmed the original results which showed Myvalube A (Convalube A) oil to be equal or superior to FA #434 oil in this mechanism at temperatures as low as -45°F. On this basis [redacted] approved use of Myvalube A as the lubricant for the 900-odd remaining units to be assembled. An interim report for the lubrication tests is to be forwarded. OK
STAT
- 2) *But something still doesn't feel right.*
The gasket test and evaluation program for the 24-Hour Mechanism has been completed and as a result the writer recommends that all gaskets be made of Buna-N material and that the back-plate cap be redesigned to make use of a Buna-N O-ring closure. [redacted] concurred and approved procurement of new gaskets. An interim report for the gasket test and evaluation program is to be forwarded. OK
STAT
- 3) Final agreement was made as to the contents of the final package for this mechanism; the items to be packaged in a tear-strip can are as follows:

- a) Clockwork Mechanism
- b) Winding Knob
- c) Cocking Plug
- d) Adapter
- e) M-34 Detonator

- f) Coupling Base Primer
- g) 20 feet of wire
- h) Small tube of obscuring compound
- i) Instruction sheet

OK

no wrench

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ORIG COMP	056	OPI 56
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August 10, 1954

No wrench is to be included in this pack. The size of the obscuring compound container is to be approximately 1/2" O.D. x 1" long collapsible tube of either aluminum or lead. OK

4) action items are as follows: STAT

- a) Authorize production of the revised back-plate cap and procure necessary O-rings. ✓
- b) Commence production of revised Buna-N gaskets of material 1/32" thick. ✓
- c) Inform New Haven Clock & Watch Company that Myvalube A is satisfactory and authorize release to Thomaston Special Tool Company of the 900-cdd movements remaining. ✓ ?
- d) Investigate possibility of making a direct substitution of commercially available O-ring gaskets for the present flat gaskets on the adapter, with the exception of the single gasket used to cushion the M-34 detonator. This latter item will remain of Corprene material as originally specified. ✓
- e) Investigate possibility of direct substitution of commercially available sub-miniature O-ring gaskets for the positive starter and stop-start spindle packing. *doesn't look promising* ✓
- f) Commence temperature vs time investigation of the 24-hour movement between the now established low limit of -45°F and +160°F. ✓

J-Feder Program

was shown the present results of room temperature timing tests being run on the J-Feder Clockwork; these results indicate that approximately 30% of the entire lot can be said to be capable of reproducibility. This 30% is to be expedited through the remaining high and low temperature tests and pushed to completion to make these items available at an early date for the Client's use. Arthur D. Little, Inc. is also to resubmit the written portion of the J-Feder instruction sheet, incorporating both the corrections previously agreed to among and such other "gems of wisdom" as may be deemed useful to field personnel. It was pointed out to that the writer recommends three (3) pages of standard weight 8-1/2" x 11" paper as the maximum size for the instruction sheet that can be readily incorporated in the proposed can. STAT


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STAT

-3-

August 10, 1954

 shall design and provide the correction sheets for these movements; the Client shall provide the operating and instruction sheets, including illustrations.

AK STAT

Very truly yours,

STAT

/mpk

Wright
Anderson

STAT

JPS:PDW

July 12, 1954

STAT

QK-15-529-AB

On Thursday, July 8, a meeting was held with []
[] of your office with regards to Work Order QK-15-529-AB. At that
time the following decisions were reached:

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1) [] is to obtain approximately 150 c.c. of
Convalube A for specification analysis. This analysis will be run either
by [] or by a contact of [] whichever is the most
expeditious.

STAT

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2) Additional lubrication tests are to be conducted on ten
movements lubricated with FA-434 and ten movements lubricated with Convalube A
over the temperature range as previously conducted. This is to be done to con-
firm the results of our recent tests.

3) There is to be included in the unit pack for the 24-hour
movement only, a wrench for the adapter.

4) [] are to confer regarding who
is to print the J-Feder instruction sheet and calibration chart.

STAT

If any of the above does not meet with your approval, please notify
us at your earliest convenience.

Very truly yours,

STAT

DOC	REV DATE	BY
ORIG COMP <u>036</u>	OPI <u>06</u>	TYPE <u>01</u>
ORIG CLASS <u>01</u>	PAGE <u>1</u>	REV CLASS
JUST	NEXT REV	AUTH: HR 10-2

cc: H. F. Knight

STAT

JPS:mpk

July 8, 1954

STAT

QK-15-529-AB

This is to confirm the decisions reached in telephone conversations with your [redacted] on July 1 and July 7, 1954. At that time it was requested by him that we make an additional test of 10 movements each with the two types of lubricants previously tested, namely, FA #434 and Myvolube oils, in a temperature range similar to the previous runs. This is to be done to corroborate the previous tests. It was pointed out that this would mean an additional three weeks delay in the program, but it was felt by [redacted] that these tests are important enough so that this must be accepted.

STAT

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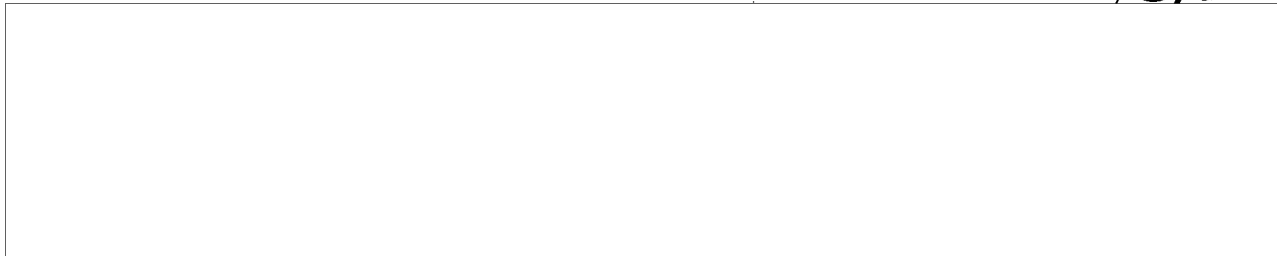
In addition to the above, approval for the revised cocking plug produced by Thomaston for the 24-hour mechanism was given. If any of the above does not meet with your approval, please notify us at your earliest possible convenience.

Very truly yours,

STAT

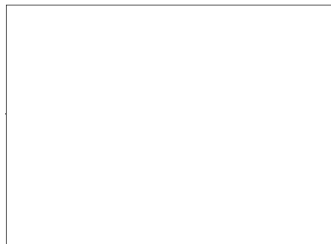
DOC	REV DATE	BY
ORIG COMP	056 OPI 56	TYPE 01
ORIG CLASS	M PAGES 1	REV CLASS
JUST	NEXT REV	AUTH: MR TD-2

Handwritten signatures and initials:
W. A. R. O. S. T. A. G. R. O.
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HFK/mpk

June 15, 1954



OK-15-529-AB

Subject: Tooling Inventory for
24-Hour Clockwork Delay Mechanism

In accordance with a recent request by ,
the enclosed list of tooling for the 24-hour clock-
work delay mechanism is forwarded for your files.

Very truly yours,



Enclosure: One list of two pages

DOC	REV DATE	BY
ORIG COMP	056	OPI 56
ORIG CLASS	M	PAGES 3
JUST	NEXT REV	AUTH: MR 10-2

Page Denied

Form Tools

		Part Number
1 for	Adapter Body	1668-1
1 for	Adapter Striker	1668-2
1 "	Cocking Device	8684
1 "	Plug	2651
1 "	Cap	1628-1
1 "	Packing Nut	1684-2
1 "	Adapter	1687-1
1 "	Adapter	1684-1
1 "	Knob	1684-4
1 "	Packing Nut	1687-2
1 "	Trip Lever Stud	1614-1
2 "	Striker (Cut-off and form)	1604-1
1 "	Sear Stop Pin	1616-1
2 "	Latch Pin (Cur-off and form)	1612
1 "	Safety Pin	1625-1
1 "	Shaft	1684-3

Fixture

For jig boring and tapping case

1 - 7/16 20 NF hole

1 - 7/16 36 NF hole

Also spot face same

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HFK:mem

May 27, 1954

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QK-15-529-AB

Enclosed, for the inspection and general information of your project engineer in charge of QK-15-529, are the latest prototypes available from Thomaston Special Tool Co. of the AB adapter and cocking device.

During a recent visit to the reservation, [] expressed concern regarding the shape of the adapter firing pin point; this concern was based on the fact that the M-34 detonator, for which the adapter is designed, requires an extremely sharp stab-action firing pin for reliable performance. It will be noted that the enclosed prototype meets this requirement satisfactorily.

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The adapter prototype has been thoroughly checked against both the M-34 detonator and the clockwork case for both proper thread mating and end clearances. The recent change of the detonator end, removing 0.015" from the thread length, has corrected interference previously experienced, and the detonator now mates fully onto the adapter, compressing the gasket as required for a good seal. The tolerances for the 7/16"-20 clockwork case thread are being reduced to insure interchangeability and proper diametral clearance. No other difficulty has been experienced.

As regards the cocking device, the enclosed prototype reflects Thomaston's redesign of the original lock-type cocking device submitted to your office with a memorandum dated January 14, 1954. We believe that this new prototype represents a more practical approach to the manufacturing and operational problems of the cocking device than did the previous unit. This new unit, with a brass, rather than an aluminum, head is recommended for your approval.

Very truly yours,

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ORIG COMP	036	OPI 56
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Encls: 2

Hammarstrom
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April 30, 1954

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 C-58214-AB

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Subject: Proposal for the J-Feder and 24-Hour Delay Mechanism Program - QK-15-529-AB

In accordance with our telephone conversation of April 14, 1954, our request for funds on work order QK-15-529-AB is hereby withdrawn. The following is our proposal for a continued program of research and development for the J-Feder and the existing 24-Hour Clockwork Delay Mechanisms.

Objectives

The primary objective of this program is to provide a basis for continued research and development for both the J-Feder and the existing 24-Hour Delay Mechanisms along the general lines of attack outlined by [redacted], in memoranda dated July 28 and December 4, 1953.

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Continued testing and evaluation of both the J-Feder and the 24-Hour mechanisms will be continued at the facilities of Arthur D. Little, Inc.; the developmental production work already committed for the latter unit will be continued on a sub-contractor basis by New Haven Clock and Watch Co. and Thomaston Special Tool Co.

The ultimate objectives of this program will be accomplished when the following are achieved:

- a) Evaluation and report thereof for the J-Feder Delay Mechanism performance characteristics and limitations, and
- b) The completion of final Specifications and Drawings, based on the results of the testing and evaluation program outlined herein, for the existing 24-Hour Delay Mechanism, and the presentation of a Final Report thereof.

Introduction

Since early in 1951, [redacted], has engaged in a program of clockwork delay research and development which had, as its primary purpose, STAT

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-2-

April 30, 1954

the review of the U. S. Navy Ordnance Department Demolition Firing Device Mk 3, its adaptation to a longer time delay period and the procurement of manufacturing facilities to produce components for the altered device. In conjunction with the Automatic Temperature Control Co., the original assembly manufacturer, New Haven Clock and Watch Co., the original watch movement manufacturer, Leeds and Northrup Co., Thomaston Special Tool Co. and your own project engineers, the Mk 3 Firing Device was altered in many ways to meet the desiderata laid down by your office.

The procurement of production facilities for the altered Mk 3 device, now redesigned as a 24-hour delay mechanism and designated by us as the AB mechanism, was a time-consuming phase of the initial development. The original assembly and movement manufacturers, Automatic Temperature Control and New Haven Clock and Watch Companies, were somewhat disinclined to renew their wartime efforts in this direction, as were many other firms which were approached with this task in mind. Several watch movement manufacturers flatly refused to become involved in the project of a movement development, primarily on the business basis that there could be no promise of large production lots involved in the assignment. During the early part of September, 1952, however, New Haven Clock and Watch Co. stated that they would undertake the redesign and production of their "pocket" watch movement for the project. Thomaston Special Tool Co. had earlier indicated that they would accept the assignment of the case and accessory development and production.

The great majority of time between procurement of manufacturing facilities and the present has been occupied by the process of assembly redesign, based on the experience of the sub-contracts and test results from [redacted], and the necessary tooling-up to translate these redesign items into actual components. This latter process, handled entirely by New Haven Clock and Watch Co. and Thomaston Special Tool Co., was conducted at an extremely conservative rate until the middle of 1953, at which time the overall AB design was deemed satisfactory in its major conception. At that time the sub-contractors were instructed to expedite their respective tooling. This process was sometimes severely hampered by the relatively low priority assigned the project, in relation to their normal manufacturing schedule, by New Haven Clock and Watch Co.

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During the period mentioned above, research projects were conducted by [redacted], to determine the general operating characteristics of the so-called "commercial dollar watch" movement under various conditions of lubrication and temperature. The results of these investigations, in conjunction with recommendations from such sources as Leeds and Northrup, the National Bureau of Standards and both lubricant and watch manufacturers, were used as an additional basis for the redesign of the New Haven movement to suit our purpose. It is worthy of note here that the opinion of all whom we consulted on the subject was that satisfactory lubrication of watch movements for operation over a wide temperature range was a problem having only a compromise for an answer, there being no known lubricant at that time which could singly provide all the desired characteristics for the purpose outlined. The evaluation of movement performance under various lubrication and temperature conditions still continues, with the field now reduced to the Frankford Arsenal oil #434 and Consolidated Vacuum Products Corp. "Convalube A" (previously called "Myvolube A").

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April 30, 1954

A pilot production of 89 AB mechanisms was received from Thomaston Special Tool Co. during the latter part of 1953 for the purpose of test and evaluation prior to the writing of specifications and the authorization for final assembly of the 900-odd units remaining in the developmental order. This evaluation program is now in process at the [redacted] Inc., facilities.

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During April, 1953, some 90 J-Feder 21-Day Clockwork Delay Mechanisms were received from your office, and a phase was initiated to overhaul and evaluate them for performance characteristics. This phase was not considered in the original assignment of the over-all program; it was introduced, however, since it by nature was closely related to the entire AB assignment. The scope of the J-Feder phase grew to include the design and procurement of an adapter, the design of a shipping plug and wrench, the investigation of a wet-use package, and the design, procurement of material and planning for a unit packaging program for this mechanism. The evaluation of the J-Feder performance and its packaging is now in process at the [redacted] facilities.

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As a result of the experience gained during the conduct of the program outlined above and the progress made to date, it is proposed that this program be continued along the following lines of attack.

Scope

a) J-Feder Delay Mechanism

Phase I, J-F

- 1) Completion and submission for your review of sketches and recommendations for the J-Feder Instruction Sheet.
- 2) Completion of repair of some 5 movements having broken mainsprings; readjustment of some 7 movements to bring their operation up to a satisfactory standard for evaluation.
- ✓ 3) Completion of the re-timing and rate-setting of all movements in the horizontal position at room temperatures.
- 4) Rechecking of operating characteristics at room temperature, -20°F and +120°F, as outlined in the original test program dated July 28, 1953. The thermal plunge, temperature cycling and test sequencing are to be eliminated from this agenda.

It is estimated that Phase I, J-F, will require three months to complete, although procurement of new mainsprings for the damaged movements may require an additional month. This contingency will delay only those movements on which repair work was to be done.

Phase II, J-F

- 1) Completion of individual calibration sheets for each movement, based on the data collected from performance testing at room, low and

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April 30, 1954

high temperatures. This can be accomplished at no appreciably greater expenditure of time and funds than would be required by statistical evaluation, since it would require only transposition of data from the test results to individual sheets for packaging with the movements. This change in attack from statistical limit-setting to individual consideration of the movements is based on the fact that the movements do not exhibit uniform performance characteristics; this makes statistical evaluation, except on the basis of a very large sample, rather difficult and of questionable value.

- 2) Packaging of the movements, with accessories, instruction and calibration sheets in accordance with the prototype package and its modifications already submitted to and approved by your project engineers.

It is estimated that phase II, J-F, will require six weeks to complete, contingent on the instruction sheet availability at the time packaging is scheduled to begin.

Phase III, J-F

- 1) Completion of a report evaluating the J-Feder movement and accessory performance under the conditions tested and covering the details of operations conducted during the entire J-Feder program.

It is estimated that Phase III, J-F, should be completed simultaneously with the packaging outlined in Phase II.

b) 24-Hour Delay Mechanism

Phase I, 24-Hour

- 1) Continue the comparative performance evaluation of Convalube "A" and FA #434 lubricants at low temperatures in the existing 24-hour assembly, to determine if and at what temperature one demonstrated a clear-cut supremacy over the other. At -40°F this condition has not yet been established. The original outline for testing, dated December 4, 1953, included both the dry state and "Molykote" lubricant; the dry state is being continued as a reference, since many investigators have confirmed the fact that this is the condition yielding best results at low temperatures. Molykote has been dropped from the agenda because it is extremely difficult to place properly in the movement.
- 2) Concurrent with (1) above, continue the testing of various gasket materials and sealers for their applicability in the most probable environments of use, i.e., in solvents, fuels and lubricants, and underwater, to determine the best material or at least the best compromise material for the purpose.

It is estimated that Phase I, 24-Hour, will require 1 month to complete.

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April 30, 1954

Phase II, 24-Hour

- 1) Depending on the results obtained from the Phase I lubrication tests, prepare the test lot for further evaluation runs by overhauling as necessary and relubricating with the oil chosen for the program. Should this oil be FA #434, authorization would be given New Haven Clock and Watch Co. to relubricate the remaining 900-odd movements of the developmental lot.
- 2) Depending on the results of Phase I gasket tests, authorize Thomaston Special Tool Company to either complete the production of the presently specified gaskets or procure another material and produce the necessary gaskets.
- 3) Incorporate the findings of Phase I into the specifications and complete the tentative specifications for the movement, case and accessories. These tentative specifications shall then be closely reviewed by Arthur D. Little, Inc., New Haven Clock and Watch Co., Thomaston Special Tool Company, and your project engineers.

It is estimated that Phase II, 24-Hour, will require six weeks to complete, with the exception of the review of the specifications by those parties concerned. No estimate is offered regarding the time required for this latter item.

Phase III, 24 Hour

- 1) Concurrently with the execution of the latter parts of Phase II, conduct timing tests of the entire test lot, using the lubricant chosen by Phase I, at various temperatures from the established low to +160°F. Treatment of the data obtained from these tests will be by statistical means and the evaluation will be as outlined by Mr. R. G. Brown's addendum to H. F. Knight's memorandum of December 4, 1953.

It is estimated that Phase III, 24-Hour, will require 10 weeks to complete.

Phase IV, 24-Hour

- 1) Concurrently with the execution of all other phases, the drawings will be made reflecting latest design changes in the movement, case, accessories and packaging. The final photolith copying of the drawings will not be done, however, until the completion of all phases and the acceptance of the developmental lot.

It is estimated that Phase IV, 24-Hour, will require three months, not including the time required for photolith copying.

Phase V, 24-Hour

- 1) At the completion of the timing tests outlined in Phase III and their evaluation, the test assemblies will be overhauled as neces-

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April 30, 1954

sary to put them in condition for a series of maximum usage and storage tests. It is highly essential that a very close liaison be maintained between [redacted], personnel and your project engineers during this phase to insure that your knowledge of the probable maximum field usage and storage conditions be utilized to the fullest possible extent.

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It is estimated that Phase V, 24-Hour, will require two months to complete.

Phase VI, 24-Hour

At this time, barring unforeseen difficulties in testing and evaluation, the AB mechanism should be ready for a final and complete review of specifications. This should be accomplished and an agreement should be reached among all concerned before authorization is given for the final assembly of the 900-odd developmental lot components.

It is estimated that Phase VI, 24-Hour, including the final assembly of the components, will require 4 months to complete.

Phase VII, 24-Hour

- 1) Upon delivery of the remaining 900-odd assemblies, the final unit-packaging of the AB assembly, its accessories and instruction sheet, will be accomplished at the facilities of [redacted]

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It is estimated that Phase VII, 24-Hour will require three weeks to complete.

Phase VIII, 24-Hour

- 1) At the completion of the overall review and evaluation of the AB unit and its specifications, the Final Report and Specifications will be initiated.

It is estimated that Phase VIII, 24-Hour, will require three months to complete.

Reports

In addition to the close verbal liaison which will be maintained between [redacted], personnel and your project engineers, it is anticipated that the program will require reports on the following basis:

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- a) Status Reports similar to those now required for other cases, submitted at the end of each one and one-half month period.
- b) Interim reports in greater detail than the Status reports submitted at the conclusion of each of the phases previously outlined.
- c) The Final Report, including a complete history of the program with Final Specifications and Drawings.

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April 30, 1954

Personnel

[redacted], will be in charge of the program for [redacted]
 [redacted], and it is understood that he will look to [redacted]
 for general direction on your behalf. Formal reports and matters of
 policy shall be under the direction of [redacted]; requests for funds,
 if necessary, shall be approved by [redacted]. The Review Board here
 will exercise review powers as necessary during the program.

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Consideration

The following cost estimate is based on both the experience gained during the program to date and our best estimate for the requirements of the program continuation. No allowance for contingencies, other than those mentioned herein, has been made, since no realistic assessment of difficulty and unforeseen delays and costs can be made at this time.

Labor (12 months @ \$568)	\$6,816
Overhead @ 74%	5,043
Materials and Equipment	725
Travel and Subsistence	750
Packaging Materials	1,500
*Sub-Contracts	<u>5,000</u>
Total	\$19,834
Fee @ 7%	<u>1,366</u>
Total	\$21,200

Labor Breakdown per month:

	<u>Rate</u>	<u>% Time</u>	<u>Amount</u>
Project Supervisor	5.96	10	\$86.00
Project Director	3.97	20	114.00
Mechanical Engineer	3.12	30	135.00
✓ Draftsman	2.84	40	164.00
Technician	1.93	25	<u>69.00</u>
Total			\$568.00

*As per quotations of Thomaston Special Tool Co., dated 30 Jan 1954 and New Haven Clock and Watch Co., dated 21 Jan and 6 April 1954, and best estimate for re-working.

Very truly yours,

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January 18, 1954

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Re: 58214-AB
QK-15-529

In reference to the attached memorandum from [redacted]
to [redacted] dated January 14, 1954, re: Revised
Cocking Device for AB Case, this is to advise that
two (2) of the items described therein are being trans-
mitted to you today under separate cover.

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Yours very truly,

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ae

Presd - [signature]

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ORIG COMP <u>052</u>	OPI <u>06</u>	TYPE <u>01</u>
ORIG CLASS <u>M</u>	PAGES <u>1</u>	REV CLASS
JUST	NEXT REV	AUTH: HR 70-2

Anderson

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HFK/mpk

December 9, 1953

Thomaston Special Tool Company
 271 East Main Street
 Thomaston, Connecticut

Attention of

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Gentlemen:

C-58214-AB

This will serve as formal acceptance of items 1
 and 2 in your quotation letter of October 15th, as follows:

- | | | |
|-------------------|------------------------|-------------|
| 1. Adapter | unit cost in 1000 lots | \$1.60 each |
| | tooling | \$110.00 |
| 2. Cocking device | unit cost in 1000 lots | \$.40 each |

As regards the quotation for the positive starter
 given in your letter as \$1.40 each with tooling costs of
 \$850.00, we would appreciate a review and confirmation of
 the unit cost stated. This is requested as the result of
 fact that since the time of your original quotation, you
 have developed and have accepted a new design for a starter
 which may cause a change in the amounts quoted.

Very truly yours,

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ORIG COMP <i>056</i>	OPI <i>56</i>	TYPE <i>01</i>
ORIG CLASS <i>M</i>	PAGES <i>1</i>	REV CLASS
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m-975
AUG 4 1953

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July 31, 1953

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QK-15-529
C-58214-AB

Attention is called to report:

Clock Delay Mechanism CD-12 MOD OW/CA-23
H. A. Miller, 24 July 52
Naval Mine Depot, Yorktown, Pa.

This report can be ordered through ASTIA, Order No.
AD - 10,847. In case you should find any matters of interest
in this report, transmittal thereof to us would be appreciated.

Yours very truly,

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bd

DOO	REV DATE	BY
ORIG COMP	056	OPI 56
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ms. view. Clark
MAY 28 1953 *24 hr*
M-82-

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May 26, 1953

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C-58214-AB
QK-15-529

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Enclosed please find duplicate copies of our letter to
The New Haven Clock & Watch Company summarizing our
discussions there on May 19, 1953.

Yours very truly,

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Encls.

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ORIG COMP	056	OPI 56
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		REV CLASS
		AUTH: HB 10-2

*uring Venice, Clockwork
24 hr,*

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May 11, 1953

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Re: QK-15-529
58214-AB

Enclosed is a memorandum of May 5th by Mr. [] with respect to this work order. Unfortunately we are again faced with a major difficulty on this project. [] and the writer plan to visit the New Haven company on or about May 19, the earliest date which could be obtained.

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While we will make every effort to reactivate and accelerate this program at New Haven, we will take all possible steps to assure continuance of the program even if we are forced to sever relationships with New Haven. Among others, the possibility of finding a suitable instrument firm which could rework parts supplied by New Haven will be considered. Since your representative will be present at the meeting in New Haven, such possible alternatives will be firmed up after establishing our future relationship with this company.

Yours very truly,

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DOC	REV DATE	BY
ORIG COMP <u>OSb</u>	OPI <u>5b</u>	TYPE <u>01</u>
ORIG CLASS <u>M</u>	PAGES <u>1</u>	REV CLASS
JUST	NEXT REV	AUTH: MR 70-2

○ *Fusing Rev., Cl.*

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March 25, 1953

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Re: QK-15-529
58214-AB

Enclosed is a memorandum of March 23, 1953 with respect to the above case. It appears that we finally are beginning to attain some action by New Haven. In the interest of keeping momentum, we placed with them a purchase order for the movements even though their estimate was not detailed as requested.

It should be noted that New Haven did not quote a fixed price, however, they were informed that any upward revision of the unit price would require our prior approval.

Yours very truly,

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CONFIDENTIAL*Receipt hand carried*STAT
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pdw

March 5, 1953

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OK-15-529-AB*Testing Rev., Clockwork*

Enclosed you will find two receipts for two copies of a memorandum by [] entitled "Progress Report on Temperature Testing of Clockwork". These memorandums were transmitted to your office by [] on February 25, 1953.

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We should appreciate your signing original receipt and returning it as soon as possible. The carbon copy may be retained for your files.

Very truly yours,

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Encs.: Receipts

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ORIG COMP <u>OSb</u>	OPI <u>56</u>	TYPE <u>01</u>
ORIG CLASS <u>M</u>	PAGES <u>1</u>	REV CLASS
JUST	NEXT REV	AUTH: NR 70-2

CONFIDENTIAL

*Timing Dev., Clockwork***CONFIDENTIAL**

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February 13, 1953

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OK-15-529

Enclosed memoranda of February 9 with respect to visits to New Haven Watch and Clock Company and Thomaston Special Tool Company indicate that at last some progress is being made. It is hoped, in particular, that work at New Haven can be accelerated soon.

With respect to the cocking plug design of the Thomaston Company, it should be mentioned that the main difference with Mr. Wilson's design is the use of a bayonet instead of a screw connection with the case. Unless there were reasons which we have not foreseen, we would feel the bayonet design to be preferable in view of its simplicity and lower cost.

Yours very truly,

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ELK:bd

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CONFIDENTIAL

CONFIDENTIAL

*Turning over,
clockwise*

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pdw

January 9, 1953

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QK-15-529-AB

Enclosed you will find your copy of the Tentative Specification dated March 5, 1952, which was inadvertently left at the Field Station on January 7, 1953.

Very truly yours,

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Encs.

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